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MINERAL COMMODITY REPORT

——SALT——

1985

CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY

UNIVERSITY OF CALIFORNIA
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SPECIAL PUBLICATION 82

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EUREKA
CALIFORNIA

SPECIAL PUBLICATION 82

MINERAL COMMODITY REPORT

——SALT——

1985

By
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Part I from
the U.S. Bureau of Mines publication,
Mineral Commodity Summaries, 1984

CALIFORNIA DEPARTMENT OF CONSERVATION
DIVISION OF MINES AND GEOLOGY
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INTRODUCTION

This report on the availability and demand for salt in the United States, the world, and California, is one of a series of Mineral Commodity Reports prepared by the Department of Conservation's Division of Mines and Geology (DMG) to describe the mineral commodities of significant importance to California and the nation.

This report was compiled by Hasmukhrai H. Majmundar of the DMG staff. Part I of the report consists of United States and world-wide mineral-statistic information and analysis adopted directly from the U.S. Bureau of Mines "Mineral Commodity Summaries" (1984). Part II discusses production of the commodity in California. The U.S. Bureau of Mines presents the earliest Government estimates of non-fuel mineral-industry data, including world resource data provided by the U.S. Geological Survey.

In 1983 the United States produced 33 million tons of salt, sold or used 31.5 million tons of that produced, imported 5.5 million tons, exported 1 million tons, and had an apparent consumption of 36 million tons. The imports were from Canada (39 percent), Mexico (28 percent), Bahamas (13 percent), Chile (5 percent), and several other countries (15 percent). The demand for salt in the United States is expected to increase at an annual rate of 1.5 percent through 1990.

Salt is the key ingredient in 14,000 products with more than 1,200 uses for it. About half of the salt used or sold in the United States is consumed by the chemical and plastic industries. About 26 percent of the salt is used for deicing highways. The rest of the salt is used in paper and food products, agriculture, water treatment, petroleum, metal production and in several miscellaneous applications. Of the nine sites proposed by the Department of Energy for investigation as potential repository sites for high-level radioactive waste, seven are either in bedded salt formations or salt domes.

One of the important source rocks for salt is halite or rock salt. Deposits of rock salt are formed mostly by evaporation of saline water. The other sources of salt are brines from playas, isolated basins, salt lakes, and sea water. The salt produced in the United States comes from brine (48 percent), rock salt (36 percent), vacuum, and open-pan evaporated salt (10 percent) and solar evaporated salt (6 percent). California is one of the few places in the world where the solar salt industry using sea water has been perfected and modernized.

Salt resources are necessary to this country because it is the backbone of the chlor-alkaline and plastic manufacturing industries. In fact, the level of the nation's industrial development can be estimated accurately by measuring its salt consumption. In 1983, nationwide, about 5000 workers were employed directly in the salt production industry.

For further information please call (916) 445-5716, the DMG centralized information number.

PART I: UNITED STATES AND WORLDWIDE

1. UNITED STATES PRODUCTION AND USE

The quantity of all forms of salt sold or used by producers in 1983 decreased an estimated 17% compared with that of 1982, and the value decreased from $671 million in 1982 to about $600 million in 1983. In 1983, 46 salt producing companies operated 87 plants in 16 states. Twenty-two of the companies sold or used over 95% of the salt.

The chemical industry consumed about 49% of the salt sold or used by producers. Most of the salt used by the chemicals sector was for manufacturing chlorine and caustic soda. Salt used for highway deicing accounted for approximately 26% of the domestic salt demand. Paper and food products, agriculture, water treatment, petroleum, metal production, and several other minor applications constituted the remaining end uses of salt.

Based on final 1982 data, the estimated percentage of salt sold or used by type in 1983 was salt in brine, 48%; rock salt, 36%; vacuum- and open-pan evaporated salt, 10%; and solar evaporated salt, 6%.

2. SALIENT STATISTICS--UNITED STATES[1]

Salt (Data in thousand short tons, unless noted)

	1979	1980	1981	1982	1983[e]
Production	46,317	41,483	38,899	37,651	33,000
Sold or used by producers	45,793	40,352	38,907	37,880	31,500
Imports for consumption	5,275	5,263	4,319	5,451	5,500
Exports	697	831	1,046	1,001	1,000
Apparent consumption	50,371	44,784	42,180	42,330	36,000
Value: Average, dollars per ton f.o.b. mine/plant					
Vacuum-and open-pan salt	$61.64	$76.44	$79.68	$86.63	$90.00
Solar salt	$12.16	$15.65	$18.35	$18.01	$18.50
Rock salt	$10.00	$14.65	$13.76	$13.90	$14.00
Salt from brine	$ 4.51	$ 6.50	$ 5.91	$ 6.21	$ 6.25
Pressed block, all sources	$52.12	$63.20	$66.14	$67.84	$68.00
Stocks, yearend[e]	1,540	2,671	2,663	2,434	3,934
Employment: Mine and plant	5,000	5,000	5,600	5,000	5,000
Net import reliance[2] as a percent of apparent consumption	10	7	8	11	8

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[e] Estimated
[1] Excludes Puerto Rico
[2] Defined as imports - exports + adjustments for Government and industry stock changes.

3. RECYCLING
None.

4. IMPORT SOURCES (1979-82)
Canada 39%, Mexico 28%, Bahamas 13%, Chile 5%, Other 15%.

5. TARIFF

Item	Number	Most Favored Nation (MFN)		Non-MFN
		1/1/84	1/1/87	1/1/84
In brine	420.92	4.2% ad val.	3.7% ad val.	20% ad val.
In bulk	420.94	1.1% ad val.	Free	26% ad val.
Other	420.96	Free	Free	11¢/100 lbs

6. DEPLETION ALLOWANCE

10% (Domestic), 10% (Foreign).

7. GOVERNMENT STOCKPILE

None

8. EVENTS, TRENDS, AND ISSUES

A salt company in Louisiana placed its evaporative salt facility on a standby basis on June 3 because of escalating natural gas and oil costs and an over supply of evaporated salt in southern U.S. markets. The company continued, however, to operate its rock salt mine at the Louisiana location and its other salt facilities in Michigan, New York, and Ohio.

The Department of Energy proposed that nine sites, seven of which were either bedded salt formations or salt domes, should be further investigated as potential repository sites for high-level radioactive waste. Under terms of the Nuclear Waste Policy Act, the first high-level radioactive waste repository is scheduled to be constructed by 1998.

The Environmental Protection Agency approved the limited nationwide use of the NAPEG process to break down polychlorinated biphenyls (PCB's), which are suspected carcinogens once widely used as coolants and flame retardants in transformers. The process uses sodium salts and polyethylene glycol to destroy PCB-contaminated oil without creating significant air and water pollution problems.

A U.S. company funded by the U.S. and Saudi Arabian governments developed a freezing technique for water desalination. As freezing begins, seawater separates into freshwater, ice, and brine. The new process requires 60%

less energy than the multistage flash distillation method and less pretreatment than the reverse osmosis technique. The process was scheduled to be employed at a 55,000-gallon-per-day desalination plant at Yanbu, Saudi Arabia by 1985.

From a 1980 base, demand for salt is expected to increase at an annual rate of about 1.5% through 1990. It is estimated that in 1984 domestic mine production of salt will be 35 million tons and U.S. apparent consumption will be 40 million tons.

9. WORLD MINE PRODUCTION AND RESERVE BASE

	Production		Reserve Base*	
	1982	1983e	Quantity	
United States (sold or used)[1]	37,880	31,500	Large	
Australia		6,200	6,300	
Canada		8,900	9,000	
France		7,330	7,400	
Germany, Federal Republic of		12,700	12,800	
India		11,004	12,000	
Italy		5,000	5,000	Reserves are large
Mexico		8,800	8,900	in principal salt-
United Kingdom		7,600	7,500	producing countries
Other Market Economy Countries		29,086	28,200	but grades are
China		17,600	19,000	unknown. The oceans
Poland		4,700	5,000	comprise an inex-
U.S.S.R.		17,000	18,000	haustible supply
Other Centrally Planned Economies		12,200	12,400	of salt.
World Total		186,000	183,000	

10. WORLD RESOURCES

World resources of salt are virtually unlimited. Domestic resources of rock salt and salt from brine are located in many Northeast, Central Western, and gulf coast States. Saline lakes and solar evaporated salt facilities are close to populated regions in the Western United States. Nearly every country in the world has salt deposits or solar evaporation operations of various sizes. However, some countries must import additional quantities of salt to meet consumption requirements.

11. SUBSTITUTES AND ALTERNATES

There were no economic substitutes or alternates for salt. Calcium chloride, hydrochloric acid, and potassium chloride can be substituted for salt in deicing, certain chemical processes, or food flavoring, but at a higher cost.

* Pending establishment of criteria for the reserve base, classification of data is based on a judgmental appraisal of current knowledge and assumptions.

PART II: CALIFORNIA

12. CALIFORNIA GEOLOGICAL OCCURRENCES

Salt occurs in the following natural environments in California: (a) in brines from playas, isolated basins, salt lakes, and sea water; and (b) as rock salt in sedimentary bedded deposits.

Brines. Salt is present in almost all natural waters. Sea water is essentially a solution of sodium chloride having an average salinity of about 3.5 percent, with a range of 1 percent to more than 5 percent. The composition of the dissolved salts is very uniform, the majority of which is sodium chloride. The rest of the minor salts include magnesium chloride, magnesium sulfate, calcium sulfate, potassium sulfate, calcium carbonate, and magnesium bromide. Waters of undrained basins in the deserts are high in total dissolved solids. Terrestrial waters, too, have sodium chloride and other soluble salts. Salt is obtained from the playas and salt lakes by pumping out the brine and recovering the salt by solar evaporation.

The most important source of salt in California is the solar salt recovered by the evaporation of the water from the sea. The main factor on which this recovery depends is dry climate with high evaporation rate and absence of rain for a considerable portion of the year. Other factors affecting the solar recovery of salt are availability of large areas of land for the construction of water-tight evaporating ponds and markets for salt within a minimum distance. California is one of the few places in the world where the solar salt industry from sea water has been perfected and modernized.

Rock salt. Deposits of more or less pure halite (rock salt) have been formed mostly by evaporation of saline water. Deposits of rock salt exist only in arid climates, under favorable conditions, where they have been buried and protected from solution. Important deposits of salt associated with strong brine exist in some of the intermittent lakes and playas of the desert regions in California. Rock salt occurs in folded and faulted Tertiary lake beds in the Avawatz Mountains in association with gypsum and celestite. No salt is being produced from these beds, at present.

13. CALIFORNIA LOCALITIES

The salt deposits in California are shown in Figure 1 and are listed in Table 1. In San Bernardino County, deposits of salt associated with concentrated brine occur in several dry salt lakes (Dale, Danby, Cadiz, Bristol, Searles, Soda, etc.) that occupy fault-formed basins. Danby, Cadiz, and Bristol Lakes occupy a northwest-trending trough for 50 miles. It is believed that Danby and Bristol Lakes are the remnants of the Pleistocene waterway from Death Valley to the Colorado River. Searles Lake is part of the Owens River drainage system that existed during the Pleistocene Epoch; the lake has various layers of thick salt bodies buried in the mud in a 20-square-mile area. Soda Lake, the

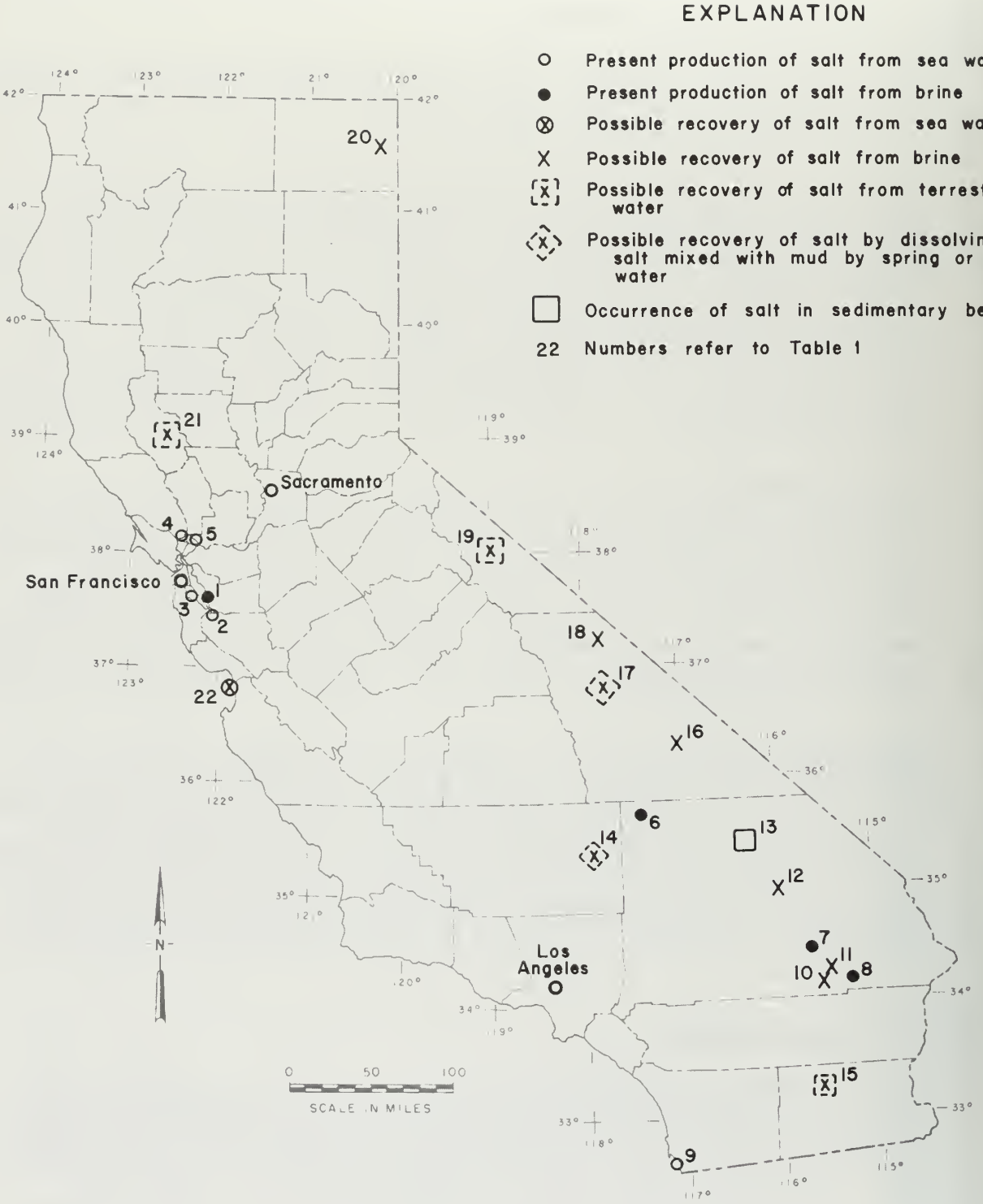
EXPLANATION
Present production of salt from sea water
Present production of salt from brine
Possible recovery of salt from sea water
Possible recovery of salt from brine
Possible recovery of salt from terrestrical water
Possible recovery of salt by dissolving salt mixed with mud by spring or rain water
Occurrence of salt in sedimentary beds
22 Numbers refer to Table 1
Sacramento
San Francisco
Los Angeles
N
0 50 100
SCALE IN MILES

Figure 1. Salt deposits in California (numbers refer to Table 1).

TABLE 1. SALT DEPOSITS IN CALIFORNIA.

No. on Figure 1	Deposit locality
1.	Salt evaporators in Alameda County, Leslie Salt Company.
2.	Salt evaporators in Santa Clara County, Leslie Salt Company.
3.	Salt evaporators in San Mateo County, Leslie Salt Company.
4.	Salt evaporators in Napa County, Leslie Salt Company.
5.	Salt evaporators in Solano County, Leslie Salt Company.
6.	Salt in Searles Lake, San Bernardino County, Pacific Salt and Chemical Company.
7.	Salt in Bristol Lake, San Bernardino County, Leslie Salt Company.
8.	Salt in Danby Lake, San Bernardino County, Standard Salt and Chemical Company.
9.	Salt evaporators in Chula Vista, San Diego County, Western Salt Company.
10.	Salt in Dale Lake, San Bernardino County.
11.	Salt in Cadiz Lake, San Bernardino County.
12.	Salt in Soda Lake, San Bernardino County.
13.	Salt deposits in Avawatz Mountain area, San Bernardino County.
14.	Salt deposits near Saltdale in Koehn Lake, Kern County.
15.	Salt from Salton Sea, Imperial County.
16.	Salt in Death Valley, Inyo County.
17.	Salt in Saline Valley, Inyo County.
18.	Salt in Deep Spring Valley, Inyo County.
19.	Salt from Mono Lake, Mono County.
20.	Salt in Surprise Valley, Modoc County.
21.	Salt in Borax Lake, Lake County.
22.	Salt from the Bay near Moss Landing, Monterey County.

sink of the Mojave River, covers an area of about 80 square miles in the north-central part of San Bernardino County. Deposits of rock salt in association with gypsum and celestite occur in folded and faulted Tertiary lake beds in the northern foothills of the Avawatz Mountains of San Bernardino County.

Salt also occurs near Saltdale in Kern County in Koehn Lake, which is considered to have been formed by faulting in the early Pleistocene Epoch. Salt also occurs in the playas of Deep Springs Valley, Saline Valley, and Death Valley in Inyo County and in Borax Lake in Lake County. Small quantities of salt have been recovered from brines in Surprise Valley in Modoc County, which is a 40-mile-long fault trough. It has also been recovered from the saline waters of Salton Sea, Mono Lake, and salt marshes near Moss Landing in Monterey County. At present, solar salt is recovered from Chula Vista in San Diego County and from the San Francisco Bay region in Alameda, Napa, San Mateo, Santa Clara, and Solano Counties. Salt is also produced by solar evaporation of brine at Bristol, Danby, and Searles Lakes in San Bernardino County.

14. CALIFORNIA PRODUCTION

There are four salt-producing companies in California: Leslie Salt Company, Western Salt Company, Pacific Salt and Chemical Company, and Standard Salt Company. Since 1978, Leslie has become a subsidiary of Minneapolis-based Cargill Inc. As all four companies are privately owned, their financial data are not public. Conservatively speaking, the estimated total California salt production averages about 1.38 million tons of salt per year with estimated annual sales of about $57.5 million. Of this, 94 percent of the salt is produced by solar evaporation of sea water. The remaining 6 percent is produced in the dry lakes by pumping the brine into the ponds and allowing it to evaporate under the sun. The production remains more or less steady year-by-year, unless some catastrophy like heavy rains occurs. Market conditions can also decrease the production considerably. Leslie Salt Company's Napa evaporators could not be harvested in 1983 because the Napa plant's only customer, Dow Chemical Corporation at Pittsburg, did not run at full capacity. The Napa plant produces 200,000 tons of salt yearly.

To produce one million tons of salt annually, it is necessary to pump ten billion gallons of sea water each year into evaporating ponds which stretch for 25 miles along San Francisco Bay. The maximum yield of evaporated salt in this area is 40 tons per acre. Leslie Salt Company's Newark plant has 1,300 acres of final crystallizing ponds. A six-inch layer of crystals at the bottom of the crystallizing evaporators is the product of a five-year process, during which the bay water of normal salinity (about three percent) is progressively converted to a supersaturated solution containing 25 percent NaCl. The draining of the final crystallizing evaporator is timed very precisely because further concentration needs to be stopped before other salines (including magnesium and bromine salts) crystallize and add unwanted impurities.

Leslie Salt Company uses about 40,000 acres of evaporator ponds on San Francisco Bay. It owns 28,000 acres and has salt harvesting rights on an additional 12,000 acres from the San Francisco Bay Wild Life Refuge. About 38.2 million gallons of sea water are fed into the system each year. Leslie produces every line of salt produced in the salt industry. It is a "full-product line" company and 200 different products are packaged from its Newark plant alone.

Ocean Salt Company, a Long Beach-based United States-owned company, imports salt from Baja California, Mexico at the yearly rate of 1,560,000 tons. Suppliers of this salt are a joint venture of the Mexican government and a Japanese firm, Mitsubishi. Ocean Salt Company employs 25 persons and supplies salt to the industrial plants of southern California. The crude salt is received at the Long Beach pier, is washed, kiln dried, and screened in a mill at the terminal, and is then packaged for further distribution or supplied in bulk. Ocean Salt Company is the biggest supplier of salt in southern California, supplying almost 50 percent of the industrial demand of the area.

Southwest Salt Company of Phoenix, Arizona, Utah Salt Company, and Great Salt Lake Minerals also ship minor quantities of salt to southern California. Southern California producers formerly shipped salt to Nevada, but because of transportation problems, the shipments to Nevada have been decreased. Utah companies can ship to southern Nevada plants using one railroad company; while Southern California producers have to use three railroad companies to ship salt to that area. Leslie Salt Company supplies salt to the western states including California, Hawaii, Oregon, and Washington, as well as to the southwestern inter-mountain states of Arizona, Idaho, Nevada, New Mexico, and Utah. Leslie Salt Company also exports salt to British Columbia in Canada.

15. UTILIZATION AND MARKETS

There are more than 1,200 uses of salt. Salt is the key ingredient in 14,000 products. It is the foundation of much of the chemical and plastic industries. The level of a nation's industrial development can be estimated pretty accurately by measuring its salt comsumption. According to some economic historians, people came to California because there was a bay at San Francisco, good farm soil in the hinterlands, and gold in the hills. But, it can be said that industry came to California because there was a good supply of inexpensive salt. According to Alan Woodhill, President of Leslie Salt Company, if salt production stops in the Bay Area, then, industries will move away. The following is a quantitative estimate of the end-uses of salt in California:

A. Chlor-alkaline manufacturing industries (chlorine-caustic; hydrochloric acid; dyes, organic, and other chemicals; ammonia, and hydrogen manufacturing; rubber reclaiming; soaps, solvents, bleaches, and detergents; petroleum refining; textile processing; insecticide concentrates; water, sewage, and swimming pool sterilization; industrial and household sanitation; vegetable oil refrigeration, etc.).....40%

B. Water treatment (municipal, industrial, and home).....20%

C. Food processing (canning and preserving; meat packing; fish curing; butter, cheese, and other dairy products; snack foods; and other food preparation).....20%

D. Agriculture and livestock feed mixing industries (free-choice feeding blocks).....10%

E. Miscellaneous uses (table and other human consumption; hides and leather tanning; metallurgical; ice cream making; road deicing; dust control on unpaved roads; and other special uses).....10%

Leslie Salt Company is the only company in California that supplies salt to eight other western states and also exports to Canada. Three Los Angeles-based salt companies, Western, Pacific, and Standard, produce more salt than they can market. This is mainly because of competition from the imported salt from Mexico. These three companies supply salt only to the Los Angeles and southern California industrial area.

All the crude salt from Leslie Salt Company's Napa plant is sold to Dow Chemical Corporation in Pittsburg, California for their chlorine and caustic soda plant. All the crude salt from Leslie's Redwood City plant is sent to Georgia Pacific Company in Bellingham, Washington and to FMC Corporation in British Columbia, Canada. A portion of Leslie's Newark harvest is sold to adjacent Morton Salt Company, a national firm, in a crude form. Morton refines and packages the salt.

Millions of migratory birds, including pintail and canvasback ducks, feed each winter in the salt marshes in the evaporators in the San Francisco Bay National Wildlife Refuge, in which Leslie has a right to harvest salt. The San Francisco Bay salt evaporators are also important as "fish farms." "Artemia salina," a brine shrimp that thrives in water salty enough to kill fish, is harvested from the salt evaporators and sold throughout the nation as food for tropical fish. A few years ago, Leslie introduced a new type of pet food made from freeze-dried brine shrimp.

Leslie Salt Company also has salt-producing operations in Australia, mainly for chlor-alkaline industries.

California salt industries employ about 550 employees.

16. MINING METHODS AND BENEFICIATION

The salt harvest season begins about the end of September and ends in the beginning of December. During this time, the harvesting is done 24 hours a day. This work includes scraping the crystallizing evaporators and piling up big mounds of salt, some taller than an eight-story building. The producers rush to get all the salt out of the crystallizing evaporators before the winter rains dilute the brine, which has been carefully accumulated for five years and evaporated in the summer sun. In the San Diego Bay area, it takes less time (two and one-half years) because of less rain and a warmer climate. The evaporators are linked with the refinery by an intricate network of channels and canals.

Bay water is taken into the evaporators twice a month at high tide ("Spring Tides") in order to make it easier to move the water from evaporator to evaporator by gravity flow in the later stages of evaporation. Even an inch of elevation is important to avoid pumping expenses. Most of these channels face northwest into the prevailing wind so that waves will push more water into the intake canals during the few hours when the dikes are opened. The water must be taken into the system when the Bay is saltiest. All the evaporators are connected by various canals. In the San Francisco Bay area, Leslie Salt Company also has several big pipes under the Bay which deliver brine from Alameda County

to San Mateo County. The floors of the evaporators must have a slope of one inch to 300 feet, so that water can drain out properly. Exact depth is important to assure that each part of each evaporator gets the same amount of sunlight and wind to aid evaporation. The final crystallizing evaporators are the most important part of the operation. At this stage, 11/12ths of the original sea water has been evaporated, and a white foam of salt crystals form on the surface and sink to the bottom. Care should be taken not to allow all water to be evaporated; otherwise, crystals of pure salt would be coated with various bitterns.

There are three grades of salt: crude undried solar salt, kiln-dried salt, and vacuum salt. A big, broad-based scraping machine, resembling a giant vacuum cleaner, which can be adjusted to a millimeter of accuracy, scrapes the salt crystals from the final crystallizing evaporators and dumps them into narrow-gauge railroad cars, whose tracks can be moved. This crude salt is taken by trains to a giant washing machine, which removes the outer layer of bitterns. Salt is then moved to a pile by conveyor belt. This salt is dried in a rotary kiln. This kiln-dried salt is then dissolved, chemicals are added to remove impurities, and the salt is recrystallized. The resulting vacuum-grade salt is 99.994 percent pure NaCl.

Leslie Salt Company follows the above process of refining. Western Salt Company of San Diego washes the salt and makes the piles. Salt is then dried and packaged. Western Salt Company does not make the vacuum-grade salt. Pacific and Standard Salt companies scrape the salt from their evaporators and supply the crude-grade salt to industries without washing because the salt is pure. Their washers remain idle. Both these companies also pump brine from wells and evaporate it to form sodium chloride salt, harvest it, and pass on the leftover brine to chemical companies for removing other salines.

17. CALIFORNIA EVENTS, TRENDS, AND ISSUES

Leslie Salt Company is one of the biggest landowners in the San Francisco Bay area with property in six of the nine Bay counties. Though the production of salt is the mainstay of a large portion of the Bay area's industry, slowly and surely, urbanization is encroaching on the salt farms. Part of the city of San Mateo consists of tract homes built on converted salt evaporators. Other salt evpaorators have been condemned for sewer plants and highways. In 1967-1968, in Redwood City and Belmont, Leslie converted 4,653 acres of some of their most productive evaporators to create the Redwood Shores real estate development. Another section of the evaporators has been converted to the Marine World amusement park. Leslie also sold more than 15,000 acres of land to the U.S. Government to make a National Wildlife Refuge. Leslie still has the

right to produce salt in this refuge. All around the Bay, city planners and city councils are demanding that Leslie convert the salt evaporators to a "higher and better use." But a wholesale wiping out of salt production would be a serious blow to the Bay area economy, particularly to the chemical and plastic industries, which built plants in the Bay area largely because of the plentiful supply of inexpensive high-grade salt. The Bay area evaporators can produce a natural resource perpetually. Although historically Leslie has used the land almost exclusively for salt production, they understand that it can't always be used for this purpose alone. These evaporators might be converted to urban use in the coming decades. But, some of the geological problems such as land subsidence in Alameda and Santa Clara counties and the presence of active faults in San Mateo County will make urbanization more and more difficult and slow.

Leslie and Western Salt companies face one environmental problem. After the sodium chloride salt is taken out of the final crystallizing evaporators, the leftover bitterns have magnesium carbonate along with calcium and other salts. These companies had problems discarding these bitterns. After dilution, they wanted to put them back into the Bay where they came from. While awaiting EPA consent, they found a use for these bitterns in dust control. All unpaved secondary roads have dust problems, and water is sprinkled on them to let the dust settle. This is a very short-term remedy because the water evaporates quickly. The salt producers have found that if bitterns are mixed with the water, the water evaporates more slowly. Salt producers have started selling these bitterns to logging contractors, in bulk, for their dust control problems. In the dry lakes region in San Bernardino County, the salt producers dispose of leftover bitterns by injecting them (after removing other salines) back into the wells.

There is a future potential market for generating electricity using the solar evaporators containing salt-brines. Israel produces electricity from salt-brines. At present, Southern California Edison Company has a lease from the Metropolitan Water District to experiment in producing electricity from salt-brines. If the use of salt for producing electricity proves economically feasible, the demand for salt will increase by millions of tons. The process of producing electricity from salt involves the placement of a layer of salt-brine solution under a layer of fresh water. These two layers have different temperatures. Scientists make use of this phenomenon in generating the electricity.

The future for salt production in California continues to look bright provided that the competition of the Mexican salt shipped to the markets of southern California can be met.

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